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ENIGMOGRAMMA BASIGERA (NOCTUIDAE, PLUSIINAE) AS A SPECIALIZED TRANSIENT PEST OF *LOBELIA* IN NEW JERSEY.

The plusiine tribe Argyrogrammatini is primarily an Old World tropical group but a few species occur in the New World, including five in the eastern United States (Lafontaine and Poole, 1991). Four of these currently occur in New Jersey, but probably only as occasional to abundant migrants. The fifth, *Argyrogramma verruca* (Fabricius), apparently has not been collected there in more than 60 years. LaFontaine and Poole (1991) referring to the tribe globally state that as far as known larvae are polyphagous on various herbs.

In 1998 the second author was cultivating over 700 cardinal flower (*Lobelia cardinalis* Linnaeus) plants from local seed stock in outdoor pots placed in tubs of shallow water at Heislerville, Cumberland County, New Jersey. In early August significant defoliation began to appear, especially of basal rosettes. Several species of Noctuidae were involved but overwhelmingly the culprits were green plusiine loopers, and in mid August an adult *Enigmogramma basigera* (Walker) eclosed from one of them. Soon after, a new wave of defoliation started and some large plants were almost completely eaten and most plants were damaged. By late August, the defoliators were nearly all Plusiinae, and over 20 more *E. basigera* eclosed. The larvae appeared consistent (verified by both DFS and Tim McCabe) with previous descriptions (e.g. LaFontaine and Poole, 1991) and an illustration of one of them is provided here by McCabe (Fig. 1). No plusiine larvae appeared on any other species of cultivated or wild plants growing with or near the cardinal flowers. A brief life history account follows.

Fig. 1. Larva of *Enigmogramma basigera*.

Eggs were laid in groups of approximately 6–20 on a *Lobelia* leaf, usually on the underside. They hatched in about five days and the first two instars stayed on the original leaf, scraping it from the underside. Older larvae dispersed and became solitary, but often remained on the same plant if there was sufficient foliage. They hid, often on the underside of a basal leaf, when not feeding. The larval stage lasted about 20 days in summer. Fairly substantial cocoons were spun on the undersides of *Lobelia* leaves or on the outside of flower pots just above water level. The pupal stage lasted about a week or slightly more in summer, but cocoons spun 17 September eclosed 30 September and 3 October with none on the two intervening cool days (maxima 21°C). Larval abundance peaked in early September, which represented at least a second local brood. While many larvae were removed in September, several dozen were not and many were seen as late last instars or cocoons. With lows around 10–14°C and highs about 17–21°C in early October, larvae consumed food at about a third the rate they did in summer. Caged adults were sluggish and mostly inactive at night under such conditions and no new eggs were seen on the outdoor plants after mid September. The last wild adults were seen around 1 October and a few reared ones eclosed later that month, but no eggs or larvae appeared in October. Cooler conditions may have prevented reproduction, or perhaps the last adults emigrated. No feeding damage was seen on basal rosettes over winter or in spring, and although cardinal flower cultivation continued for two more years, no *E. basigera* in any stage has been observed again at this site or on wild cardinal flowers through 2006. However, DFS collected a female nectaring on Buddleia in September 2002 at nearby Port Norris.

Lobelia siphilitica Linnaeus was also accepted whether or not offered with cardinal flower, but larvae refused many other herbs. They refused *Hydrocotyle umbellata* Linnaeus (Apiaceae), a previously reported foodplant (Lafontaine and Poole, 1991), if even poor quality *Lobelia* was present, and usually even in its absence if they had eaten any earlier the same night. Larvae starved for twelve hours or more would eat *Hydrocotyle* but consumption was perhaps half as fast as with cardinal flower leaves, and *Hydrocotyle* probably is not really a suitable foodplant. Five larvae that were

about two days into the penultimate instar were forced to eat *Hydroctyle* for one night and were then placed with foliage of the following plants, Chenopodiaceae: *Chenopodium album* Linnaeus, Asteraceae: *Aster lateriflorus* Linnaeus (also flower buds), *Bidens* sp., *Cichorium intybus* Linnaeus, *Taraxacum officinale* Weber (dandelion), *Krigia* sp., and a *Lactuca* cultivar (Boston lettuce); Commelinaceae: *Tradescantia virginica* Linnaeus, *Commelina* sp. ("Wandering Jew"); Plantaginaceae: *Plantago lanceolata* Linnaeus, Violaceae: *Viola*? *papilionacea* Pursh-Rydberg, Phytolaccaceae: *Phytolacca americana* Linnaeus, Solanaceae: *Physalis* sp., *Solanum* sp. (nightshade); and two grasses: a *Panicum* seedling and a mature *Setaria* species. After they completely refused to feed on any of these through two nights, cardinal flower foliage was added the next day and all five located it and fed within an hour. Similar results were obtained in a second trial using these same five larvae as late ultimates and, after they ate all of the *Lobelia cardinalis*, one of them also ate some *Hydrocotyle* after only 6–8 hours. Three other starved last instars refused water hyacinth (Pontederiaceae: *Eichhornia crassipes* (Mart) Solms), two others refused *Polygonum* sp. (Polygonaceae) and *Hibiscus mocheutos* Linnaeus (Malvaceae) and all five opted to starve for 48 hours. These mal-treated larvae were not runty as adults but they required nearly an extra week as larvae. An ability to recover from starvation and/or malnutrition for at least one to three days (even twice in the last two instars) is noteworthy because if larvae defoliate a *Lobelia*, finding another one could take substantial time. We do not know if such larvae could successfully mature on *Hydrocotyle*, which would be much easier to locate in some habitats.

Enigmogramma basigera does not appear to be a generalist, and is probably a *Lobelia* specialist. It is possible that prior feeding on *Lobelia* influenced subsequent host rejection, but the first author has reared hundreds of species of Lepidoptera over the past 40 years and has never encountered prolonged complete refusal to switch among normally suitable foodplants. Furthermore larvae were starved or forced to feed on *Hydrocotyle* before they rejected 19 genera in eleven families, including even dandelion and lettuce which nearly all polyphagous herb feeding Noctuidae readily accept. Dussourd (2003) also reports *L. cardinalis* as a foodplant for *E. basigera* and describes larval leaf-trenching behavior, but does not discuss whether larvae are polyphagous or specialists. He does note that a polyphagous leaf-trenching argyrogrammatine, *Trichoplusia ni* (Linnaeus), failed to mature on *L. cardinalis*. Foodplants of other *Enigmogramma* are apparently unknown. Our observations also suggest that *E. basigera* does not overwinter in New Jersey. If adults do not function well at about 10–20°C, they probably could not maintain normal activity in winter north of central Florida, although larvae probably could overwinter farther north. The first author collected a wild larva of another plusiine, *Autographa precationis* (Guenee), in his yard at Port Norris on basal rosettes of either *Conyza* or *Erigeron* in late November 2005 and reared it outdoors. It continued to feed, mostly on dandelion, molted on 1 January and 28 February, began to spin a cocoon on 27 March, and the adult eclosed 1 May. *E. basigera* probably has similar habits on *Lobelia rosettes*, but not as far north.

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